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ABSTRACT

This report summarizes the status of major educational telecommunications systems and plans in 16 western states as of early 1991. The information contained in this report was obtained from members of the Western Cooperative for Educational Telecommunications, a membership organization working to strengthen the efficiency, impact, and quality of educational telecommunications systems and programs. Most of the current 150 members are institutions of higher education, but the Western Cooperative also involves public school agencies and districts, state telecommunications agencies, public broadcasting systems, libraries, and private firms. The information presented herein is intended to be useful for the compilation of planning approaches, the inventory of existing resources and expertise, and the identification of possibilities for regional cooperation. The first of three sections for each of the states provides an update on the status of planning and/or coordination of state systems for educational telecommunications. The second section highlights some of the major institutional networks and activities designed to extend off-campus access to education. Also reported in this section are programs targeted at elementary and secondary students and teachers. Section 3 includes the name of the state-elected representative to the Western Cooperative's Steering Committee. The 16 member states of the Western Cooperative are Alaska, Arizona, California, Colorado, Hawaii, Idaho, Minnesota, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. (DB)

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STATE PLANNING AND IMPLEMENTATION OF EDUCATIONAL TELECOMMUNICATIONS SYSTEMS IN THE WEST

by Dwight Dively and Mollie McGill

for the
Western Cooperative for Educational Telecommunications
an initiative of the
Western Interstate Commission for Higher Education

The Western Cooperative for Educational Telecommunications is an initiative of the Western Interstate Commission for Higher Education (WICHE).

WICHE is a nonprofit regional organization established by interstate compact to help western states to work together to provide high-quality, cost-effective programs to meet the education and manpower needs of the western region. Member and affiliated states are: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Minnesota, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

The Western Cooperative for Educational Telecommunications was established by WICHE in July 1989 to promote resource and information sharing in the use of telecommunications and other technologies for education. For further information, contact the Western Cooperative, P. O. Drawer P, Boulder, CO 80301-9752. Telephone: 303-541-0231. Fax: 303-541-0291.

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INTRODUCTION

Purpose

This report summarizes the status of major educational telecommunications systems and plans in 16 western states as of early 1991. The information contained in the report was obtained from members of the Western Cooperative for Educational Telecommunications, a membership organization working to strengthen the efficiency, impact, and quality of educational telecommunications systems and programs. Most of the current 150 members are institutions of higher education, but the Western Cooperative also involves public school agencies and districts, state telecommunications agencies, public broadcasting systems, libraries, and private firms.

This report is the fifth in a series on state telecommunications activities; a listing of the earlier reports appears in the appendix. The information presented in this report will be useful for several purposes, including:

- Compilation of planning approaches. Most of the western states have prepared one or more statewide telecommunications plans. The processes for preparing these plans and the results included in the plans may provide guidance for other states or institutions in their planning efforts.

- Inventory of existing resources and expertise. The western states have developed a wide array of telecommunications capabilities and the accompanying expertise in system design, administration, and usage. This report can be used to identify systems that may offer models for other states to use.

- Identification of possibilities for cooperation. Many of the needs for educational telecommunications are common for several states in the West. This suggests the possibility of developing multi-state solutions for some educational needs.

Organization and Scope

Each state report includes three sections.

- Section one provides an update on the status of planning and/or coordination of state systems for educational telecommunications.

- Section two highlights some of the major institutional networks and activities designed to extend off-campus access

to education. Systems that are used on a single campus or that have little statewide effect are generally not included. Also reported in this section for some states are major programs targeted at elementary/secondary students and teachers, such as the new Star Schools projects awarded to western states.

While this report is not intended to be a comprehensive survey of all educational telecommunications facilities in the region, a related and useful resource is available to Western Cooperative members. The Western Cooperative, through its Clearinghouse Committee, has developed a database of the technical and programmatic resources currently in use or planned by its member institutions.

- Section three includes the name of the state-elected representative to the Western Cooperative's Steering Committee. Readers who have questions or comments about a particular state report can contact either the appropriate Steering Committee representative or the Western Cooperative office directly.

Summary of Major Trends

Telecommunications systems in the 16 western states illustrate a wide range of technologies, management approaches, and program offerings. Each state has pursued its own approach to planning for educational telecommunications. Some have developed comprehensive plans before any major systems were funded. Others have allowed systems to develop without any statewide planning or coordination. Still others have tried to draw existing systems together by imposing statewide plans. Despite this variety of systems and planning approaches, several major trends emerge from this review:

- Use of educational telecommunications continues to grow. The use of existing systems grew in almost every state as more people and institutions sought access to educational programming. Several states started or completed the development of new systems during 1990. The most significant of these new systems included the Hawaii Interactive Television System, the refurbished microwave backbone in Idaho, and Oregon's comprehensive Ed-Net system.

- Many states developed comprehensive telecommunications plans. Over half of the western states were in the midst of telecommunications planning activities in 1990. These plans were generally of two types. The first type was designed to help states with relatively few telecommunications resources, such as Montana and North Dakota. Plans of this type involved needs assessments followed by designs of the

most cost-effective systems to meet those needs. The focus of such plans was on selecting the most important needs, determining appropriate technologies, and developing funding strategies.

The second type of planning process occurred in states with fairly extensive telecommunications capabilities, such as California, Colorado, and Washington. These plans usually were focused on questions of governance, priorities for usage, and funding for operations. In some cases, the latest plan is the second or third effort for that particular state.

- Cooperation among different telecommunications users expanded. Until recently, higher education institutions, public schools, libraries, public broadcasters, and state and local governments typically operated independent, uncoordinated telecommunications systems. In the last few years, financial and administrative pressures have encouraged cooperation among different institutions in many of the western states. This trend continued in 1990, with several states establishing or strengthening coordinating bodies.

- The role of telephone common carriers was studied. In several states, the telephone common carriers are seeking to offer comprehensive audio, video, and data services to state governments or educational systems. Many of these states are struggling with how to handle such situations. In some cases, the carrier is an active partner in an overall state strategy; in other states, carriers may be competitors for government-owned systems.

The year 1991 is likely to be a critical one for educational telecommunications in the West. Many states will consider funding plans for new systems, and others will see requests for expanded access to existing systems. New governance plans will be considered in at least five states. The Western Cooperative is positioned to facilitate the exchange of information among planners in the region.

STATE REPORTS

Alaska

1. State Efforts to Plan and Coordinate Educational Telecommunications

Alaska has pioneered the use of educational telecommunications in the West. Because of the vast distances separating population centers, the state's educational and governmental leaders recognized the potential value of telecommunications as long as twenty years ago. In the late 1970's, the state made significant investments in audio conferencing, satellite video, and low-power television systems which were used for a wide array of educational programs. Budget shortfalls in the 1980's led to significant reductions in these systems. As the state economy improved in 1989 and 1990, renewed interest in funding for telecommunications has emerged.

2. Major Systems and Activities in Place or Under Development

The three regional campuses of the University of Alaska system each offers a variety of distance education programs designed to meet the needs of their regions.

The Anchorage campus offers a wide range of telecourses and is developing a pilot project to use computer-based instruction to bring business courses to institutions operated by the Department of Corrections. In addition, the University of Alaska Anchorage has begun delivering one-way video, two-way audio courses to selected audiences, including all military bases in the state. The satellite-based system is called Live/Net and uses faculty from throughout the University system.

The University of Alaska Fairbanks houses a Center for Distance Education and Independent Studies. The Center coordinates the delivery of courses throughout the interior of Alaska. The Bethel campus of the University of Alaska Fairbanks is experimenting with interactive digital graphics systems and hypermedia.

The University of Alaska Southeast in Juneau provides distance education courses through its Sitka campus. The University of Alaska Southeast also is putting together a Masters of Public Administration course which will be offered in a one-way video, two-way audio format via Live/Net. Plans are being developed to expand the system to offer business and public administration courses in the Yukon Territory of Canada as well.

In addition to these existing activities, the 1990 Legislature created a Center for Information Technology at the University of Alaska Anchorage. The Center plans to develop a variety of programs, including education, training, and research on information technologies. Emphases will be placed on distance communications and geographic information systems. These are especially important in Alaska because of the state's large size and the role of natural resources in the state's economy.

The University of Alaska Computer Network continues to manage the audio conferencing network and is pilot testing a multipoint interactive graphics system.

Alaska's K-12 system also has a history of extensive involvement with educational telecommunications. From 1980-85, the LearnAlaska instructional television system brought K-12 instructional programming to 250 communities statewide through a low-power transmitted, satellite system. Since then, the state has been utilizing other means to reach the rural and remote areas with instructional television and distance education services. The Department of Education recently completed a study of statewide K-12 distance education needs and implementation options.

RATNET, a state-owned and operated satellite system, is used by the Department of Education to deliver instructional programming on overnight tape feeds to rural and remote schools. RATNET also serves as the delivery means for TALKBACK, a series of live interactive television programs produced by the Department of Education which allow students to call-in and interact with experts on a wide range of subjects.

The Department of Education is a partner in a 1990 Star Schools grant to the Northwest Educational Telecommunications Partnership. Forty sites in Alaska have been selected to receive equipment and courses during the first year of the grant and another 40 sites will be added the second year, contingent upon continued funding. Many of the selected schools serve predominantly Native Alaskan students.

The Alaska Public Broadcasting Commission continues its information dissemination efforts throughout the state, emphasizing the educational role played by the individual public broadcasting facilities.

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Arizona

1. State Efforts to Plan and Coordinate Educational Telecommunications

The Arizona Education Telecommunications Cooperative (AETC) was formed in 1989 to facilitate planning and use of telecommunications systems. AETC represents all levels of public education in the state; the agency in charge of statewide telecommunications serves in an ex-officio capacity.

In 1989, the Legislature provided $80,000 to the AETC for studies of a statewide telecommunications system. The major study was an assessment of the types of technologies that could meet Arizona's educational needs and to provide information on financing and management. Two additional studies provided separate assessments of cable television and ITFS broadcasts.

The three studies, presented to the Legislature in 1990, called for expanded video capacity for both K-12 and higher education programs, and also noted the potential uses for teleconferencing services for state and local governments. The proposed state system would use a mix of satellite and land-based delivery methods. Cable and ITFS systems could play a role in an overall state system, but neither could meet all of the identified needs alone. In addition to the video system, significant expansion of audio and data systems was also proposed. The studies concluded that the total cost of the state system could be as much as $12,750,000, not including costs for equipping campus facilities.

While the AETC efforts were underway, the state's K-12 system and library department were conducting their own telecommunications studies. The Department of Education completed its "Plan for a Technology Integrated Educational Delivery System" which calls for an infusion of technologies into the public schools. This would accompany a redesign of the educational curriculum and administrative structure. The Department of Library, Archives

and Public Records completed its long-range plan, calling for a network that will allow all libraries in the state to share information.

In 1991, AETC requested enabling legislation through House Bill 2087 and $300,000 in appropriations for implementation activities, including programming and equipment purchases. At AETC's recommendation, the sponsor of HB 2087 withdrew the bill since funding was unlikely and extensive changes were being proposed to the original organizational design.

Still the membership of AETC continues to work towards further development of a statewide educational telecommunications network. Each of the educational sectors represented on AETC is providing $27,825 for each of the next three years to hire a full-time coordinator, its first staff since the cooperative was formed two years ago.

In addition, the three universities (University of Arizona, Arizona State University, and Northern Arizona University) and the Board of Regents have endorsed and designed a plan for an interactive audio and video link among themselves. The two-channel link would be used for educational programming and administrative teleconferencing. Options, such as full motion analog video and compressed video, are being explored. The system is projected to be operational by fall 1991.

2. Major Systems and Activities in Place or Under Development

In May 1991, the University of Arizona will turn on the nation's largest ITFS system in partnership with People's Choice TV. Of the 32 ITFS channels in the People's Choice system, 8 will be dedicated to distributing education in Tucson. The system will be used cooperatively by the public schools, Pima Community College, and the University of Arizona.

The University of Arizona also operates a public broadcasting system with television and three radio stations, a live video link to its campus center in Sierra Vista in southeastern Arizona, and a Ku-band satellite uplink which it acquired when it became a founding member of the National Technological University. The University of Arizona has been delivering video courses for over 20 years and this fall will begin a satellite-based program in graduate library science delivered throughout the region, a program developed in cooperation with the Western Cooperative.

Arizona State University (ASU) also operates a Ku-band uplink and a 12-channel ITFS system which delivers courses to business and industry in Phoenix. ASU is installing a compressed video link to its new campus, ASU West, and will soon add an FM station to its public broadcasting television station.

Northern Arizona University (NAU) provides undergraduate and graduate courses to its branch campus in Yuma 340 miles away via a fully interactive microwave network. NAU has completed the engineering plans to construct a similar microwave link to Mohave Community College in Kingman in the northwestern part of the state. A decision on whether or not to proceed with the construction will be postponed until June 1991.

NAU also operates a C-band uplink which is currently being used to deliver the first stage of a pilot Spanish language program for 1st and 2nd graders. The program is planned to be a progressive one, adding more advanced language instruction up through grade 6.

Yavapai College has a completely redesigned, re-engineered microwave link between its campuses in Prescott and Clarkdale. The system now involves two independent, separately licensed microwave signals. In fall 1990, Yavapai went on-line with two low-power television broadcast stations, one in Prescott and one in Clarkdale, to broadcast telecourses, and the college teaches some audio teleconferenced courses to reach students across its large service area.

The community colleges are engaged in a variety of activities, with several campuses in northeastern Arizona linked together for purposes of video instruction. Both Maricopa Community College in Phoenix and Pima Community College in Tucson utilize a variety of delivery systems for their inter-campus and community outreach instructional programs--satellite, microwave, cable, compressed video, ITFS, and audio teleconferencing. Maricopa Community College, in particular, is recognized nationally as a leader in using technologies (low-tech as well as high-tech) in education.

The State Department of Education is one of the key agencies driving the work of the AETC and the development of a statewide educational telecommunications network. Over the last two years the department has conducted extensive studies of K-12 education's programmatic and technical needs in educational telecommunications. Many of Arizona's school districts currently use various technologies, particularly satellite downlinks, to supplement their program offerings. In the Phoenix area, the nine-campus Glendale Union High School district recently completed a $1.2 million project linking its campuses via fiber.

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California

1. State Efforts to Plan and Coordinate Educational Telecommunications

Several efforts have been made to develop state telecommunications plans for some or all parts of the educational system. Although significant progress was made in many of these studies, none produced a final comprehensive plan. As a result, the Legislature passed Assembly Bill 1470 in 1989. This bill created the California Planning Commission for Educational Technology, which is charged with developing a state master plan for the coordination and use of technology at all levels of the state's educational system. Nineteen commissioners have been appointed, representing businesses and all levels of the educational system. A director was hired in March 1991, and the California Postsecondary Education Commission provides additional staff support. The Planning Commission's first meeting was in early September 1990, with a final report due by January 1992.

In response to the 1989 Senate Bill 1202, the California Commission on Postsecondary Education has prepared a statewide policy statement on the use of electronic technology for off-campus learning. The Commission submitted its report to the Legislature in March 1991, and it is anticipated that legislation will be introduced to implement the Commission's recommendations.

Another piece of legislation passed in 1990 was directed at the reorganization of The California Educational Technology Local Assistance Program. This program was first implemented in 1984 and has provided $14 million in grants for local educational technology initiatives at the K-12 education level. A restructured Education Technology Committee has been created to oversee the grant program.

At the same time, the state Superintendent of Public Instruction has established an Advisory Committee on Electronic Telecommunications in Education to develop a strategic plan for networking the state's K-12 system. The goal of a statewide telecommunications network would be to streamline administrative

and fiscal activities and improve the exchange of information and resources for instructional and administrative purposes.

2. Major Systems and Activities in Place or Under Development

Many California institutions have extensive experience with the use of telecommunications technologies. While most of these are single-campus systems, there are several systems that involve multiple institutions or serve broad geographic areas.

The California State University (CSU) system has a microwave network connecting four of its campuses in northern and central California. The system is managed from CSU-Chico, which also has extensive experience with satellite and ITFS systems. For example, CSU-Chico's master's degree program in computer science is distributed via satellite to students in 15 states. Many other CSU campuses use ITFS or satellite systems. All of the CSU facilities are connected to CSUNET which provides data communications among computer centers. Several of the CSU campuses participate in the Binational English and Spanish Telecommunications Network (BESTNET), a computer conferencing network used as the interactive component of distance education programs between the two countries.

The University of California system's involvement in educational technology has been principally in the areas of research, international student exchanges, and data communications, and less so in video-based outreach instruction although some of the campuses have used ITFS for several years. The nine UC campuses are connected via a fiber network which supports their connection to the NSFNet and the online library system called Melvyl. UCLA has developed international distance education programs with institutions in Spain, Japan, and Korea, utilizing audiographics technology.

Stanford University was a pioneer in the use of telecommunications for off-campus delivery of engineering programs. Microwave and ITFS systems are used in the San Francisco Bay area, and satellite distribution is used to reach sites throughout the U.S.

California's community colleges are served by two consortia, one in the north and one in the south. These groups started as a method for joint purchasing of courseware, but have expanded into satellite, ITFS, and cable distribution of courses, and are nationally recognized producers of telecourses and teleconferences.

Many other colleges and universities in California use microwave, satellite, ITFS, or cable systems to distribute courses.

At the K-12 education level, California's school districts have developed an extensive network of satellite downlinks. The California Department of Education works with the county offices of education to develop and coordinate teleconferenced programs throughout the state. The teleconferencing service is used for administrative meetings, professional development and teacher inservice. In addition, various ITFS systems and six public broadcasting stations distribute instructional television service to schools, districts, and county offices. These programs provide supplemental materials, not complete courses, for selection and use by the teachers.

The Los Angeles County Office of Education was the recipient of one of the four new Star Schools grants for their project, "Telecommunications Education for Advances in Mathematics and Science Education" (TEAMS). This is the first Star Schools project that specifically addresses the needs of large urban school districts. Their partners in this project are school districts in the District of Columbia, Detroit, and Boston. The TEAMS project, which received $3,450,000 in Star Schools funding, will focus on mathematics, science and technology programs and courses for middle school and high school level students.

The California Technology Project (CTP), initiated in 1988 with support from the California Educational Technology Local Assistance Program, is a cooperative project of the California State University and the California Department of Education to encourage cooperation and information sharing among schools and districts that run educational technology programs.

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Colorado

1. State Efforts to Plan and Coordinate Educational Telecommunications

Since all of Colorado's educational telecommunications systems are governed by separate institutions or organizations, statewide coordination has been difficult to achieve. To facilitate this coordination, the Colorado Legislature created the Colorado

Telecommunications Advisory Commission (TAC) which submitted its report to the Legislature in December 1989. The TAC report called for the creation of several regional clusters to provide telecommunications services and for the creation of a statewide network by 1992.

In 1990, follow-on legislation was enacted which directed the TAC to update and report progress on its 1989 plan, and to study the use of telecommunications systems by the governing boards of the state's higher education institutions. The new TAC report has called for the formation of a Colorado Learning Network, a non-profit consortium of telecommunications users that would oversee statewide telecommunications activities. The 1990 legislation also directed the state Department of Education, the Commission on Higher Education and the TAC to submit a plan for the use of telecommunications in improving math, science, and technology education in public schools.

2. Major Systems and Activities in Place or Under Development

Colorado State University (CSU) has a long history in providing distance learning via technology, specifically their videotape-based SURGE program which has been in place for over 20 years. CSU was also a pioneer in the development of satellite-based instruction. CSU is the primary uplink site for the National Technological University. They were one of the first institutions to offer credit courses nationally via the satellite/cable-delivered network of Mind Extension University, The Education Network and is currently the network's only provider of a complete MBA degree program. CSU is a founding member of the National University Degree Consortium whose goal is to increase access to external bachelor degree programs via technology, and is one of the charter members of AG*SAT, a new national agricultural educational network.

National Technological University is a private, non-profit institution that offers master's degrees in engineering specialties and management technology. NTU is a consortium of 34 engineering institutions whose top faculty teach via a national satellite network. In academic year 1990-91, more than 550 courses from the 34 member institutions were offered.

The University of Colorado system has a fiber optic network linking its four campuses. Fourteen courses were shared among campuses using this system in fall 1990. In addition, the University uses ITFS systems to distribute engineering and computer science courses to business locations in the Denver/Boulder and Colorado Springs metropolitan areas.

The University of Northern Colorado (UNC) has responsibility for providing graduate teacher education throughout most of Colorado. UNC completed its telecommunications plan in 1989 and has begun

to develop a 14-site interactive compressed video network. Three on-campus and two off-campus sites are in place, and four additional sites will be added before June 1991. Several other innovative uses of technologies are being assessed. A switched 56kb project was undertaken with Adams State College in Alamosa in January 1991.

Colorado's community colleges have formed a new organization to address their shared needs for programming, telecourse licensing, and course development. TELECOOP includes all 15 of the state's two-year colleges plus members from other agencies and institutions. The use of audiographics technology is growing among Colorado's community colleges.

Planning efforts are underway among several of the state's four-year colleges. Adams State College has assumed the lead role in designing a telecommunications network for the four-campus Colorado State College System. Similarly, the University of Southern Colorado is preparing a needs assessment for telecommunications in the southern part of the state.

Several of Colorado's elementary/secondary schools and districts have created regional telecommunications "clusters" using audiographics, fiber, cable, and other mixes of technology. The San Luis Valley BOCES received a $200,000 community development grant to underwrite the expense of connecting its member schools via fiber in 1991. In 1990, the Colorado Department of Education funded six distance learning projects and conducted a statewide inventory of technological resources available at schools and district offices.

The Colorado State Library is directing a state-funded project, called ACCESS Colorado, which will link 165 public, school, and university libraries so that their automated card catalogs and other information databases can be accessed via modem in every local calling area in the state. This project is seen as providing needed support for current and future distance learning activities throughout the state.

Some access to library catalogs, online databases, and other information and communications services are already available from the Colorado Alliance of Research Libraries (CARL) network and Colorado SuperNet. CARL links the card catalogs of many of the state's major libraries and offers the unique service of delivering copies of requested journal articles via facsimile.

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Hawaii

1. State Efforts to Plan and Coordinate Educational Telecommunications

Hawaii's unique geography has made it a prime candidate for development of educational telecommunications capabilities. Each of the major islands has at least one higher education institution, but many instructional programs have been unavailable on many islands. To address this problem, the Legislature authorized the construction of the statewide Hawaii Interactive Television System (HITS) in 1985.

HITS is a microwave and ITFS system that serves all of the islands. The basic HITS backbone was completed in 1990, linking University of Hawaii campuses on four islands with two-way, full-motion video. Other initiatives are planned to interconnect the remaining campuses of the University system and to develop linkages with local cable television firms to provide access to K-12 schools.

Meanwhile, the state government has completed a DS-3 digital microwave backbone using the HITS towers. The network will carry data, voice, and compressed video traffic for state agencies. The University system will receive two T-1 channels on this system for data networking.

2. Major Systems and Activities in Place or Under Development

Hawaii is pioneering international uses of telecommunications for education. The University of Hawaii already has extensive data and voice connections throughout the Pacific Rim via the PACCOM and PEACESAT networks, and several ideas for establishing video linkages are being discussed.

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Idaho

1. State Efforts to Plan and Coordinate Educational Telecommunications

For many years, Idaho has had a microwave backbone linking Boise, Moscow, and Pocatello, which are the homes of the state's three major universities. This backbone was operated by the state's public broadcasting system and was used mainly for distribution of public television programs. In 1988, the Legislature appropriated over $1 million to upgrade the system and extend it to all of the state's two- and four-year postsecondary educational institutions. This effort is complete and over 600 miles of microwave routing is in place. The improvement of the microwave network has already generated increased demands for courses; in fact, the time allotted higher education is used almost to capacity.

Idaho began discussing overall management and coordination of state telecommunications activities in 1987. After considerable study, a Telecommunications Council was established to support the State Board of Education. This Council now oversees the operation of the higher education network and coordinates the development and review of related telecommunications systems and programs.

The Telecommunications Council is currently revising its original policies and procedures to meet the increased demand for instructional delivery and necessary cooperation with the other state agencies. The Council will participate in a statewide initiative, funded through the Department of Administration, to review the state's telecommunications needs in all areas.

2. Major Systems and Activities in Place or Under Development

In addition to the microwave system, the University of Idaho and

Boise State University both have satellite uplinks that are used for in-state and multi-state programming. Boise State's is a C-band uplink and the University of Idaho's is Ku-band.

Boise State also offers extensive coursework over its two-channel ITFS system and via microwave connections to cable systems in three counties. BSU offers a full master's degree in Instructional Technology nationwide via computer conferencing, and, in partnership with the State Department of Education, delivers live, interactive high school courses in advanced mathematics and foreign language to small rural schools in Idaho via the statewide public broadcasting network.

The University of Idaho also maintains an interstate microwave connection to Washington State University in Spokane, which the two institutions use to share classes in certain specialized fields. Near the end of the 1990 legislative session, the University of Idaho received a supplemental appropriation of $479,500 to expand telecommunications services offered through its agricultural extension offices. Idaho has such offices in 42 of its 44 counties, and about half of these locations are already equipped with satellite downlinks. The supplemental appropriation will fund installation of downlinks at the remaining locations and will support some programming activities. Programs are expected to go beyond agricultural offerings to include education, economic development, and social service efforts.

Lewis-Clark State College has recently completed construction of a state-of-the-art telecommunication center. Both the College of Southern Idaho and North Idaho College are expanding their use of telecommunications. Idaho is a member of the Northwest Star Schools Partnership, which is described in the Washington section of this report.

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Minnesota

1. State Efforts to Plan and Coordinate Educational Telecommunications

Beginning in 1989, state leaders realized the potential value of coordinating the planning and development of Minnesota's educational telecommunications systems. The Department of Administration was directed to begin planning an integrated digital telecommunications system, titled the Statewide Telecommunications Access and Routing System (STARS). This system will ultimately include video, audio, and data networks. The 1990 Legislature authorized a $900,000 loan from the Department of Administration's revolving fund that will allow completion of the planning process and issuance of a Request for Proposals (RFP). This loan will have to be repaid over a five-year period if the STARS system is implemented.

The RFP went out in October 1990 and covers full development of the data and voice networks. The RFP provides for a gradual implementation of the video system by connecting existing networks and by adding capacity incrementally. Implementation of the STARS system will depend on actions and funding by the 1991 Legislature.

2. Major Systems and Activities in Place or Under Development

At the K-12 level, more than 25 percent of all school districts are involved in interactive network clusters, and with the addition of planned sites, almost half of the districts in the state will be covered. The state's Postsecondary Options Program which enables high school juniors and seniors to enroll in postsecondary courses has provided a major incentive for many of the K-12 clusters to build connections to a nearby college campus.

Eight community colleges deliver credit courses via two-way interactive television to area public schools, technical colleges, and other community colleges. All of Minnesota's 20 community colleges or centers are equipped with satellite downlinks which are used primarily for teleconferences.

The seven campuses of the Minnesota State University System are developing a regional two-way interactive educational television system in cooperation with K-12 districts and other postsecondary education institutions. The system uses a combination of fiber and microwave technology.

Minnesota's technical colleges are part of several fiber optic networks with K-12 schools, corrections facilities, and other college campuses; 21 of the state's 34 technical college campuses are currently connected to an operational interactive fiber

network. In addition, the Minnesota State Board of Technical Colleges (MSBTC) is a partner with the Minnesota World Trade Center and St. Paul Technical College in the operation and programming of a Ku-band satellite uplink and production facility called MnSAT.

The University of Minnesota System utilizes a variety of technologies for off-campus graduate and undergraduate instruction, including broadcast and cable television, radio, audio, and videotape. Most recently, the University has begun to implement a compressed video network which eventually will link all of its campuses. Equipment bids are out for the first link which will connect the Twin Cities campus and the four-year liberal arts campus in Morris. This link is expected to be operational by Spring 1991, with the first credit course to be a graduate level course from the College of Education. Currently, a one-way video, two-way audio microwave system is used to offer master's level programs in technical fields to the Twin Cities and Rochester. The University of Minnesota is also an active member of NTU and AG*SAT, which offer, respectively, master's level programs in engineering and agriculture via satellite.

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Montana

1. State Efforts to Plan and Coordinate Educational Telecommunications

Statewide telecommunications planning received a major boost in 1989 with House Bill 28 which provided $500,000 for a statewide study of existing telecommunications networks and for implementation of portions of the resulting plan for expansion and improvements. The study of existing systems and analysis of alternatives received $200,000 and was completed in the summer of 1990.

The consultant's report recommended the establishment of a statewide telecommunications network, implemented in three-phases over a five-year period. The network would include C- and Ku-band satellite coverage, with downlinks at every school. In

addition, two-way interactive compressed video facilities would be provided at 66 locations, including at least one in every county. Improvements to data and audio communications systems would also be made. The total capital costs of the proposal were estimated at $5,000,000.

The state is now in the process of determining how to spend the remaining $300,000 of the 1989 appropriation, along with a matching sum of $300,000 provided by a local cable television firm. Additional funding is being sought during the 1991 legislative session. In that regard, House Bill 30 was introduced at the start of the 1991 legislative session to continue the development of the plan formulated under House Bill 28. $600,000 will be requested for the next biennium as a capital equipment match. In addition, the bill outlines operational procedures and self-funding requirements for the system.

During the time of the planning study, the Montana Telecommunications Cooperative was formed to facilitate coordinated planning. Membership is open to all public and private organizations interested in educational telecommunications.

2. Major Systems and Activities in Place or Under Development

Several Montana universities and colleges have developed telecommunications systems to serve various parts of the state. Among the most significant systems are a satellite uplink at Montana State University, a Master's in Business Administration program delivered to Billings from the University of Montana via a microwave system, and Big Sky Telegraph which is a computer conferencing, messaging, and instructional network operated by Western Montana College. Big Sky Telegraph is used by teachers and students in remote areas of the state as well as by community and professional groups for information and communications services. In addition, there are several local programs that rely on cable, fiber optic, or audio systems to distribute educational programming.

The University of Montana in Missoula and Montana State University in Bozeman have come to an agreement on a joint statewide public television system. Now having Regents approval, a bill will be introduced to the 1992 Legislature for matching funds for a transmitter in Missoula and a two-way video interconnect between both campuses.

The state Department of Public Instruction is one of the participating agencies in the Pacific Northwest Star Schools program, which is described in the Washington report. In

addition, the department has enacted new rules, guidelines and procedures to facilitate the use of distance education in the public schools.

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Nevada

1. State Efforts to Plan and Coordinate Educational Telecommunications

Statewide telecommunications planning was encouraged by the passage of Senate Bill 247 during the 1989 legislative session. This bill created a Telecommunications Division within the Department of General Services and also authorized an Advisory Board on Telecommunications. The Board includes representatives of the University of Nevada System, the state K-12 system, state and local agencies, and the private sector. In 1990, the Board analyzed options for improving telecommunications capabilities and outlined ways to increase cooperation among agencies.

In addition, the University of Nevada System established a Telecommunications Committee with representatives of all seven campuses. In 1990, a survey of needs and capabilities at each campus was completed, which will be used to plan future legislative requests.

2. Major Systems and Activities in Place or Under Development

Nevada educational institutions are beginning to expand their use of educational telecommunications, as nearly 800 students enrolled in telecourses for credit during 1989-90. Currently, courses are offered primarily via ITFS, videotape, and audioconference. A T-1 link between the University of Nevada System campuses in Reno and Las Vegas is used primarily for data communications.

The University of Nevada, Reno (UNR) has been selected to serve as an Associate to the nationwide Annenberg/CPB distance education planning grant. UNR has delivered live credit courses over its instructional television system since August 1989. UNR

and Western Nevada Community College received a federal grant to extend ITFS service to a 150-mile radius by spring 1992. In addition, UNR will begin using a computer-based audiographics network to deliver a full medical technology curriculum to several sites. The University also continues to use its audioconferencing system to deliver credit and non-credit courses throughout the state.

The University of Nevada, Las Vegas (UNLV) is working with the local school district's television station to expand its educational telecommunications capabilities. UNLV recently acquired ITFS equipment and will be linked to the district's microwave system by the end of the year. Through a contract between the School of Communications and a local cable provider, the University will have access to a Las Vegas area cable channel. In addition, a 12-port audio bridge has been installed to provide instructional and administrative support.

The four University of Nevada System community colleges use videotape, audioconferencing, campus-produced video, low-power and one-way cable television to provide telecourses. The campuses are exploring alternative technologies to deliver telecourses to their multi-county service areas.

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New Mexico

1. State Efforts to Plan and Coordinate Educational Telecommunications

Several efforts to develop and implement a statewide telecommunications plan have been pursued during the last five years, although institutional-based activity has been ongoing since 1979. A New Mexico Commission on Higher Education (NMCHE) advisory committee is currently drafting a statewide policy for the use of educational telecommunications.

In 1990, the Legislature appropriated $500,000 in General Obligation Bonds for capital development of the state's instructional television (ITV) system. However, the GOB issue was voted down by New Mexico voters in November 1990.

In addition, the Legislature reassigned administrative responsibility for educational telecommunications to the Commission on Higher Education. The Commission submitted a $1,400,000 proposal to the 1991 Legislature to provide funding for policy development, faculty training, system management, and additional telecommunications infrastructure. It appears, however, that state support will not be realized this year.

Another development that will have an impact on the proposed expansion of instructional television is a plan from the region's primary telecommunications provider to install fiber connections to all postsecondary institutions in the state by spring 1992. This action will interconnect approximately 90 percent of the state.

The Legislature has requested the New Mexico Corporation Commission (NMCC) to make a ruling on the pricing structure of fiber optic telecommunications, allowing for a special rate for educational use of this medium. The NMCC will commence a schedule of public hearings in spring 1991 on this topic.

2. Major Systems and Activities in Place or Under Development

Several New Mexico universities are very active in the delivery of educational outreach programs via telecommunications. Some of the more significant programs include:

The University of New Mexico (UNM) has satellite, microwave, ITFS, and fiber connections that reach businesses, state agencies, and two national laboratories. During the past five years, these facilities have been used to offer 323 classes to more than 3,000 students.

New Mexico State University (NMSU) offers a variety of technical courses via videotape, Ku-band satellite, and a leased fiber optic system. NMSU is also a national leader in training faculty members in the use of telecommunications and has published a resource guide on instructional use of such systems.

Eastern New Mexico University in Portales has a microwave system that links it to three other cities. Ninety-six courses in business, education, and other fields have been offered during the last four years.

Luna Vocational Technical Institute in northern New Mexico has begun to offer a limited number of video classes to high schools in the eastern part of the state in a cooperative arrangement with UNM.

UNM, NMSU, and the New Mexico Institute of Mining and Technology are connected via a fiber optic T-3 video link provided by New Mexico Technet. This link is also extended to Sandia National Labs, Los Alamos Labs, and state government offices in Santa Fe. This video network is switchable and carries classes between the universities and Sandia throughout the day. The universities are then able to rebroadcast these classes to larger audiences via their satellite systems.

New Mexico Technet, a non-profit corporation, also offers many data and information applications for education. Its fiber network is available to educational facilities statewide for classroom and administrative support, information retrieval, and special programs. Access is provided through dedicated facilities, and local dial-up and 800 service.

NM Technet, in cooperation with the universities and federal labs, sponsors special programs for the state's K-12 schools, such as NEDCOMM. The New Mexico Network for Educational Communications (NEDCOMM) offers a variety of information services aimed at broadening the appeal of computer education for youth. This includes use of NEDCOMM to connect to the national Internet for international class projects. The NM Supercomputer "Challenge" is a joint effort among Technet, the universities and labs to introduce supercomputing to high schools. Totally funded through the sponsors, this competition was opened in 1991 to all high schools statewide and featured two days of training, ongoing team support, equipment loans, and curriculum support. Awards for the winners included scholarships and equipment.

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North Dakota

1. State Efforts to Plan and Coordinate Educational Telecommunications

In 1989, the North Dakota Legislature approved a bill creating the state Educational Telecommunications Council and provided funding for planning and technology grants. During 1989 and 1990, the Council and its consultant conducted a study of the state's current educational telecommunications system and developed a plan for improvements. Three of the plan's recommendations are being implemented, as follows:

- The Educational Telecommunications Council endorsed the establishment of eight regional districts covering all of the state's high schools. The districts are working with colleges, libraries, and businesses to develop telecommunications plans. Three clusters are currently operational and using different technologies, including a digital interactive video system and audiographics technology.

- The North Dakota University System and the Information Services Division are creating a statewide, two-way video network. Compressed video at a T-1 speed connects 12 sites on 10 college campuses as of 1991. Called the North Dakota Interactive Video Network (IVN), it is being used initially to offer programs in nursing, social work, and agricultural law. Half of the funding for this network came from a grant to the University of North Dakota and North Dakota State University from the U.S. Department of Agriculture's Rural Health Project.

- The consultant's study recognized that North Dakota already has an excellent network for collegiate and governmental computing. The Council is funding a pilot project to connect more than 50 high schools to the state network. This will enable the high schools to have an integrated connection to a host of collegiate, governmental, and national networks. A dedicated file server/bulletin board system will provide an affordable means of creating educational partnerships among students and teachers at distant schools.

Development will continue simultaneously on the above three tracks with integration slated to begin over the next few years. For the 1991-93 biennium, the Council received $5 million for educational telecommunications grants and $1.2 million for operational costs of the compressed video system.

2. Major Systems and Activities in Place or Under Development

In addition to efforts related to the overall state plan, other telecommunications activities are continuing in different parts of the state. The most extensive is a plan to use Prairie Public Television to broadcast a first-year high school Spanish class beginning in fall 1991. Students will interact with the teacher and tutors by telephone.

The Educational Telecommunications Council recently completed its first round of grants. Five projects won awards from the Council, four of which use interactive television and one that connects satellite signals to an existing system. Some innovative features of the grant winners are:

- A group of eight school districts will pioneer the use of passive wavelength division multiplexing. This technology enables the simultaneous transmissions of both regular phone traffic and video signals over a single optical fiber.

- Some projects include creative combinations of vocational centers with high schools and large schools districts with small districts.

- A group of very small, very remote school districts were funded to pilot the use of the NEXT computer as a low-tech, low-cost means of achieving both data and video networking.

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Oregon

1. State Efforts to Plan and Coordinate Educational Telecommunications

Oregon conducted one of the nation's most extensive needs assessment and planning efforts for educational telecommunications. In 1987, the state government established a planning committee of business and educational representatives to assess the needs and options for a state telecommunications system, and provided $250,000 to support the planning effort.

The committee completed its work and proposed a major initiative, known as Ed-Net, to the Governor and Legislature in 1989. After extensive review, the proposal was approved and $8.5 million was approved for implementation.

Since that time, the Ed-Net Board has been appointed, a Request for Proposals has been issued, and contracts have been awarded for the development of the three major Ed-Net networks. Network one provides two satellite channels for up to 800 public schools and libraries. Ed-Net is leasing a full-time transponder and has already used the satellite network for programming in Japanese, business, liberal studies, SAT workshops, and extension service teleconferences. Network two is a 15-channel compressed video system that will serve major educational institutions and business locations; this network is expected to be in place in May 1991. Network three will support data and voice communications and will be installed gradually throughout 1991.

Membership in Ed-Net will not be complete until the network is in place. However, through the Oregon higher education system office, institutions have already begun to develop guidelines for faculty involvement, receive site responsibilities, costs, etc.

2. Major Systems and Activities in Place or Under Development

Oregon is also participating in the Star Schools grant awarded to the Northwest, which is discussed in detail in the Washington report. Forty-one Oregon schools, primarily in rural and remote areas, will receive satellite downlinks and computer equipment in the first year of the grant.

The Oregon State System of Higher Education is one of seven recipients of a grant from the Annenberg/CPB "New Pathways to a Degree" program. In addition to the system office, three college campuses will contribute to the design and offering of several undergraduate degree programs beginning in fall 1991.

The Oregon Community College Telecommunications Consortium and its member campuses have been active for several years in using ITFS and cable systems for the delivery of telecourses as well as originating and receiving numerous teleconferences and courses for local industries.

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South Dakota

1. State Efforts to Plan and Coordinate Educational Telecommunications

Lack of funding has precluded efforts to develop a statewide needs assessment and telecommunications plan. The Governor's office is currently considering a plan to coordinate the state's telecommunications initiatives, which will probably be submitted to the 1991 Legislature.

2. Major Systems and Activities in Place or Under Development

South Dakota Public Broadcasting operates a statewide microwave network linking eight broadcast stations. This network is used primarily for PBS programming, but is also used for some K-12 and higher education courses. Many of these programs are distributed at night and are videotaped for use the next day.

South Dakota State University uses the state microwave network to deliver two-way, full motion video courses to the State Capitol in Pierre. The School of Medicine at the University of South Dakota runs the Medical Information Exchange (SD-MIX), a teleconferencing network that provides medical information and training to practitioners in rural areas in and outside the state. In addition, some state schools are using audiographics, teleconferencing, and out-of-state satellite programming to extend educational services.

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Utah

1. State Efforts to Plan and Coordinate Educational Telecommunications

Planning for state telecommunications activities is coordinated through the Utah Telecommunications Cooperative. Utah was the first state to establish such a cooperative, which is a voluntary association of higher education institutions, the public school system, and other state agencies that are major providers or users of telecommunications. The Cooperative has facilitated planning, funding, and management of the state's telecommunications resources, and this organizational model has been copied by several other states. The Cooperative has also worked to develop new policies related to promotion, tenure, and copyright protection to encourage faculty use of telecommunications, and recently adopted standards and priorities for the selection of academic courses to be delivered via the state's educational telecommunications networks.

Two state agencies (one for data processing and one for telecommunications) were consolidated in 1990, creating a single State Division of Information Technology Services. Educational telecommunications, however, is governed by the State Board of Regents and the State Board of Education.

Relevant to future planning is a new bill that was introduced in the 1991 Legislature which would require the preparation of a report by the Public Service Commission to the Governor, Legislature, and the submitting agency describing the effect that any plan to create, upgrade, or expand state-owned or state-funded telecommunications networks might have on telephone rate payers.

2. Major Systems and Activities in Place or Under Development

The state's largest system is a two-way interactive microwave network called EDNET. This backbone currently links 21 sites, including all nine public universities and colleges and several high schools and applied technology centers. EDNET is used for a wide range of K-12 and college-level courses. Numerous administrative meetings in both public education and higher education are conducted over the EDNET system.

EDNET is managed by the Utah Education Network (UEN) at the University of Utah. (UEN was formerly known as SETOC, the State Educational Telecommunications Operations Center.) In addition, UEN manages several other telecommunications systems. Among these is KULC, a statewide non-PBS educational channel. KULC offers non-credit telecourses and for-credit classes at both the K-12 and higher education levels.

Utah State University was a pioneer in the use of audiographics technology through its COMNET system which currently serves more than 30 locations throughout Utah and neighboring states. In 1990, Utah State University received federal funding for a satellite uplink. This will be used principally to distribute agricultural programming to other land grant institutions, as part of the new AG*SAT network.

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Washington

1. State Efforts to Plan and Coordinate Educational Telecommunications

Over the past three years, there have been several plans to implement shared and independent video telecommunications systems on a statewide basis for education. Funding for these plans has been minimal. The 1990 Legislature directed the Information Service Board, with assistance from the Department of Information Services (DIS), to..."develop and submit...a plan for the cost-effective, incremental implementation of a coordinated statewide video telecommunications system." This system would serve all levels of the educational system, state and local governments, and the general public. An appropriation of $179,000 was made for the development of the plan.

The plan, Video Telecommunications - Strategies and Directions, was submitted to the Governor and Legislature in December 1990. One of the report's basic findings is that, outside the educational community, state agency users are uncertain about the type and amount of service they will need. The plan, therefore, outlines a two-stage approach. The short term stage (2-4 years) will be a trial and building period, focusing on instruction and teleconferencing needs. The long term stage (4-8 years) is based on expected changes.

The plan recommends strategies for technology, governance, and investment. An action plan to implement the strategies will focus on four demonstration projects from which more information about applications and needs will be drawn. The demonstration projects are: the Pacific Northwest Star Schools Project, the

digital conversion of Washington State University's microwave network, teleconferencing demonstrations for state agencies, and a portion of the Triad Plan. (The Triad Plan is a cooperative effort among the elementary/secondary school system, higher education institutions, and state agencies.) Funding for each of these demonstration projects has already been obtained from a variety of sources.

During the 1991-93 biennium, DIS will establish an ongoing planning and review process for all state-funded video projects, and will design and implement a video telecommunications system that will support the varied needs of education institutions and state agencies. An implementation plan and budget will be presented at the 1993 legislative session.

2. Major Systems and Activities in Place or Under Development

Washington was one of the first western states to use educational telecommunications when it started the Washington, Alaska, Montana, and Idaho (WAMI) program in the early 1970's. This system used satellite broadcasts to deliver continuing medical education programs, but had to be discontinued due to high costs. Washington has made extensive use of intrastate educational telecommunications since the early 1980's. The most significant individual systems include the following.

The Washington Higher Education Telecommunication System (WHETS) is a microwave backbone that links Washington State University (WSU) to off-campus locations in three other metropolitan areas of the state and to the University of Washington. WHETS was originally established as an economic development tool to extend access to engineering and technical programs. However, usage has increased significantly, and course offerings have been broadened to include education, business, and liberal arts courses. WSU manages the system and uses it to support branch campuses in Vancouver, Spokane, and the Tri-Cities. WSU was appropriated $2.9 million to convert the existing analog microwave system to digital.

WHETS is linked to Idaho's microwave system by a connection between the University of Idaho and WSU. These two universities have shared a variety of courses during the last several years, including classes in agriculture and engineering.

Washington State University is also a founding member of a new national group, called the National Universities Degree Consortium. This consortium was formed to provide greater access, especially for individuals in rural and remote regions, to baccalaureate degree programs that will be offered through satellite and cable systems across the country.

The University of Washington uses cable, videotape, and satellite systems to distribute engineering courses in the Puget Sound area and as part of its membership in the National Technological University. The University and other education groups in the Seattle area are working to secure additional cable channels as part of the cable franchise renewal process.

The state's community colleges are extensive users of telecourses on videotape and cable systems. They have proposed a satellite system to link the 27 campuses. A portion of this plan will be funded through the demonstration of the Triad Plan.

The Satellite Telecommunications Educational Programming (STEP) network offers a wide array of high school level courses and teacher in-service instruction using satellite transmissions. STEP is administered by Educational Service District 101 in Spokane and targets its courses to rural high schools throughout the country.

STEP is also a key participant in the successful Northwest Star Schools initiative, which received $5,000,000 of federal funding in 1990. The project is titled the Pacific Northwest Educational Telecommunications Partnership. Under this program, 40 schools in each of five states (Alaska, Idaho, Montana, Oregon, and Washington) will be linked with an interactive satellite and computer network in 1991. The project will initially focus on small and remote schools with underserved students. Courses will be offered for all levels of the K-12 system, and faculty development programming will also be available. The computer network will facilitate prompt turnaround of written work and will allow student-to-student communications.

In the program area, public and private universities in the state have formed the Washington Satellite Consortium for Graduate Teacher Education to increase access to graduate education for teachers. Three graduate courses per year will developed by the participating institutions and delivered via the STEP and Star Schools Network beginning in fall 1991.

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Wyoming

1. State Efforts to Plan and Coordinate Educational Telecommunications

The Wyoming Telecommunications Division completed a new five-year plan for the state in 1990. This plan includes provisions for implementing a statewide telecommunications network using available facilities for data, voice, and compressed video. Under the new plan, the state microwave backbone for public radio and television coverage would be expanded which would allow increased programming from the University, community colleges, and state government. Compressed video and audiographic equipment are being installed at several locations in the state. To address issues of programming, infrastructure development and management, several institutions in the state have formed a voluntary telecommunications cooperative.

2. Major Systems and Activities in Place or Under Development

The number of program offerings and the variety of educational technologies used in Wyoming continues to grow. During 1990, the University of Wyoming offered 20 in-state classes using telecommunications, and a microwave connection to Colorado State University was used for 15 instructional interchanges. The University of Wyoming and Western Wyoming College in Rock Springs have begun pilot programming over the recently installed compressed video network between the two sites. Compressed video is also being considered to support a project planned by state government, the University of Wyoming College of Education, and ten school districts. Several of the state's community colleges offer telecourses over local broadcast or cable television facilities.

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APPENDIX

Earlier reports on state telecommunications activities published by the Western Cooperative for Educational Telecommunications and/or the Western Interstate Commission for Higher Education include the following:

Educational Telecommunications in the West: 1990 State Legislative Actions, September 1990, by Dwight Dively. Boulder, CO: Western Cooperative for Educational Telecommunications.

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Higher Education Telecommunications Activities in the West, March 1989, by Dwight Dively. Boulder, CO: Western Interstate Commission for Higher Education.

Options for Interstate Use of Telecommunications for Higher Education in the West, April 1987. Boulder, CO: Western Interstate Commission for Higher Education.

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